SECTION 550

METAL RAILING

550.1 GENERAL

This work shall consist of furnishing and erecting metal railing in substantial compliance with the specifications and the dimensions, lines, and grades shown on the plans or established by the ENGINEER.

550.2 REFERENCES

550.2.1 ASTM
A 36
A 120

550.2.2 AASHTO
M 183

550.2.3 This Publication:
SECTION 157
SECTION 520

550.3 MATERIALS

The materials shall be in conformity with the following requirements:

550.3.1 Railing shall be fabricated from the material designated on the plans. If not so designated, railing may be fabricated from either steel or aluminum alloy.

550.3.2 The design of railings shall conform to the particular type or types designated on the plans. The CONTRACTOR will be required to submit complete shop details and erection plans for all railings.

550.3.3 Steel Railings--Unless otherwise shown on the plans, structural steel for steel railings, including bolts, shall conform to the requirements of AASHTO M 183 (ASTM A 36).

550.3.4 Pipe Railings--Steel pipe for pipe railing members shall be black seamless steel pipe of the size, dimensions and details shown on the plans, and conforming to the requirements of ASTM A 120. The hydrostatic test will not be required.

550.3.5 Aluminum Railings--Aluminum alloys for all castings, tubing, structural shapes, plates, bolts and washers shall conform to the requirements of ASTM specifications for alloys for the various items required as designated on the plans.

550.4 CONSTRUCTION REQUIREMENTS

550.4.1 STEEL RAILINGS:

550.4.1.1 Steel railings shall be fabricated and erected in accordance with the pertinent requirements for the fabrication and erection of structural steel under Section 520. Steel railings shall be erected in accordance with the details shown on the plans. Care shall be taken to obtain accurate vertical and horizontal alignment.

550.4.1.2 Unless otherwise provided on the plans, all steel railing members shall be painted with one prime coat of red lead and linseed oil and two coat of aluminum paint. The paint shall conform to the requirements for paint under Section 157. The preparation of surfaces and the application, protection, and drying of paint coatings shall conform to the requirements for painting under Section 157. Surface adjacent to field welds shall not be painted until after the welds are completed. Surfaces that are inaccessible after erection shall be painted and allowed to dry before the member is erected. After erection, all abrasions and omissions shall be recoated.

550.4.2 PIPE RAILINGS:

Construction methods for pipe railings shall conform to construction methods for steel railings as outlined above.

550.4.3 ALUMINUM RAILINGS:

550.4.3.1 Aluminum railings shall be fabricated and erected in accordance with the requirements for fabrication and erection of structural steel under Section 520 with the following modifications:

550.4.3.1.1 Cutting--Material 1/2 inch thick or less may be sheared, sawed, or milled. Material over 1/2 inch thick shall be sawed or milled. Cut edges shall be true, smooth, and free from excessive burrs or ragged breaks. Reentrant cuts shall be filleted by drilling prior to cutting. Flame cutting will not be permitted.

550.4.3.1.2 Bending--To facilitate bending, material may be heated to a temperature not exceeding 400 degrees F. for a period not to exceed 30 minutes.

550.4.3.1.3 Rivet and Bolt Holes--Rivet and bolt holes may be drilled to finished size or may be subpunched smaller than the nominal diameter of the fastener and reamed to size. The amount by which the diameter of the subpunched hole is

smaller than that of the finished hole shall be at least one-quarter of the thickness of the piece. The finished diameter of holes shall be not more than 7 percent greater than the nominal diameter of the fastener except:

550.4.3.1.3.1 Slotted holes shall be as called for on the drawings.

550.4.3.1.3.2 Anchor bolt holes may be up to 50 percent greater than the nominal bolt diameter with a maximum of 1/2 inch greater than the nominal bolt diameter.

550.4.3.2 Driven heads of rivets shall be flat head or cone head. Flat heads shall have a diameter not less than 1.4 and a height not less than 0.4 times the nominal rivet diameter. Cone heads shall have a diameter not less than 1.4 and an overall height not less than 0.65 times the nominal rivet diameter. The included angle at the apex of the cone head shall be approximately 127 degrees.

550.4.3.3 Rivets shall be driven with squeeze riveters when practical or otherwise by pneumatic hammers of approved size. Rivets 1/2 inch or less in diameter shall be driven cold. Rivets over 1/2 inch diameter may be driven hot. Rivets shall be heated in a hot air type furnace providing uniform temperatures throughout the rivet chamber and equipped with automatic temperature controls. The rivet temperature shall be held between 990 degrees F. and 1,050 degrees F. for not less than fifteen minutes and not more than one hour before driving. Hot rivets shall be transferred from the furnace to the work and driven with a minimum loss of time.

550.4.3.4 Welding shall be done by an arc welding process in which no welding flux is used. The type of electrodes shall be as noted on the railing drawings. Welding shall be done only as called for on such drawings.

550.4.3.5 Tubular vertical balusters may be fastened to horizontal rails by expanding the tubes where they pass through the rails. The holes shall be drilled to a size not more than 1/32 inch greater than the nominal diameter of the baluster tube. A standard self-feeding tapered roll expander shall be used. Balusters shall be expanded to a tight fit in all rails.

550.4.3.6 The portion of the aluminum alloy anchor bolts which is intended to be exposed outside the finished concrete surface shall be given a protective coating of grease or heavy oil before the concrete is placed.

550.4.3.7 Contact with Other Materials--Where aluminum alloys come in contact with other metals or with concrete, the contacting surfaces shall be thoroughly coated as required on the railing drawings.

550.4.3.8 Except as required above for contact with other materials, aluminum railings shall not be painted.

550.4.3.9 Aluminum railings shall be erected in accordance with details shown on the plans. Care shall be taken to obtain accurate horizontal and vertical alignment.

550.5 MEASUREMENT AND PAYMENT

550.5.1 Measurement of metal railing will be made by one of the following methods:

550.5.1.1 By lineal measured foot from end to end of the metal railing in place.

550.5.1.2 By computed weight, in pounds, based on details shown on the fabricator's approved shop drawings or from detailed plans prepared by the ENGINEER when shop drawings are not required.

550.5.1.3 By the unit of the completed metal railing.

550.5.2 Metal railing will be paid for at the Bid Proposal's unit price per lineal foot or pound, or per lump sum.